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NATURAL HISTORY IN THE GRADES

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IV. FOURTH GRADE

The nature materials recommended for this grade are:

1. *Animal life*.—Further study of two or three kinds of common fish, their structure, uses of the parts of the body; nesting habits of one or two kinds if the nests can be found reasonably near the school building; where the eggs are placed and how they are cared for, the behavior of the young; optional individual and group field-study of fish in neighboring pools and streams; recognition acquaintance with the cat-bird, red-wing, blackbird, red-start, nut-hatch, kinglet, and the quail if it is available; the bird calendar and further study of bird migration should be continued; feeding and nesting habits of birds should be continued by study of some particular bird's nest if a convenient one may be had; economic value of birds as shown in the feeding habits in the particular nest referred to above, and also as shown in the habits of the birds in the garden throughout the season's garden work (see garden work below); the common snakes should be noted and should be thought of as valuable factors in the life of the region, not considered harmful as they are usually supposed to be; a further acquaintance-forming study of such insects as the coddling moth, plant lice, ant lion, and others that are common to the garden and field; spiders; the hibernation of animals in the winter season as shown by a study of their condition in the late autumn and again in the early spring. Spiders will be taken as the topic for fuller illustration of the method of treatment at the close of this list of the materials that are used.

2. *Plant life*.—Arrange a list of the trees that furnish food for the birds of the region and consider their importance with reference to the economic value of birds, the desirability of

having birds in the locality for other than economic reasons; collect fruits of trees which are edible for birds and for man or other animals, and discuss the relation of trees to the whole animal life of the region; the general uses of timber by men, elementary lumbering processes studied mainly by means of good stories about logging and lumbering; visit a good lumber yard if possible and ascertain the regions from which the timber used in the local region comes (see geography); the natural history

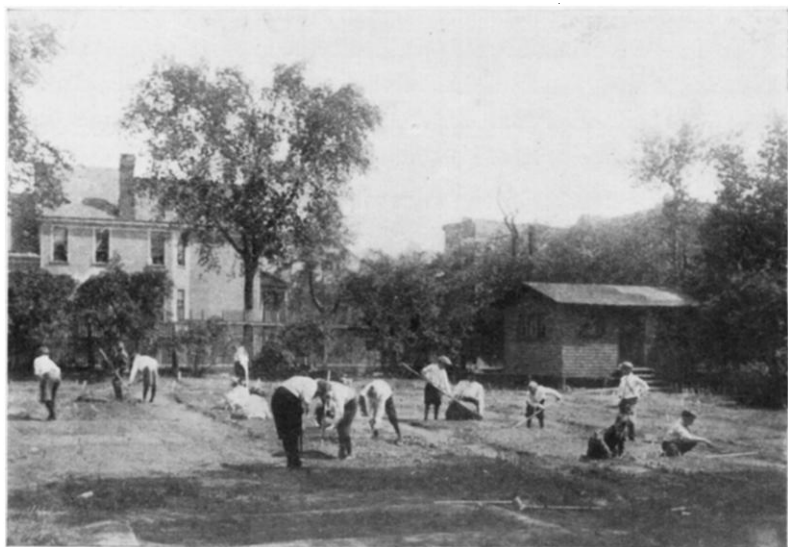


FIG. 1.—Individual plots of the fourth grade. The first cultivation, weeding, hoeing, caring for the walks.

of the trees is to be emphasized but needs to be related to the use of their products; acquaintance with the local wild flowering plants in the autumn and spring, including a half-dozen of each; the care and growth of common edible and decorative plants in the garden during which there is secured some knowledge of the nature of a plant and its relation to the earth.

3. *Garden*.—The garden work of this grade should be done with each pupil having an individual plot in which he may grow plants of his own choice in so far as that choice is possible and harmonizes with the general plan of the garden (Fig. 1);

each pupil should be made responsible for the care of his garden and should own the results therefrom; each will need careful direction as to planting and cultivation, watering, removing the products at the right time and in the proper way, but with all there should be maintained the feeling of responsibility and ownership from which the best results come; plans and drawings to scale should be made before the time for the outdoor work to begin; also attention should be given to starting from slips and cuttings some of the things that are to be needed in the garden; in the autumn seeds for the next year's use should be collected, labeled and put away where they may be safely kept; during the progress of the garden work, constant attention should be directed to watering, drainage, condition of the soil, weeds, and their effects upon other plants, insect enemies of garden plants; a few of the methods to be used as protection against these insects should be discussed; the effects of the birds and other animals of the garden as the toad upon the well-being of the garden; a garden record should be kept and will serve well as the basis of language work, and for the art work.

In making the detail plans for the individual gardens, care must be taken to see that pupils do not include too much material, and that it is so arranged that when grown some things will not shade the others (Fig. 2), or that in case of flower gardens some plants will not hide others. In one garden which I visited last year there was a row of castor beans around the outside of the bed inside of which was a row of petunias, which in turn inclosed a small bed of sweet alyssum. Had all of the castor beans grown they would have had much less space than they needed even with several times the space allotted to this whole plot, and those that were able to grow so completely shaded the things within the garden that the latter received no light and could not have been easily seen had they grown. Within this group of gardens several illustrations were seen of this lack of proper planning. While the pupil should make his plan and decide in the main what he will grow, this plan and the things selected should be so carefully supervised that failure will not result. It is sometimes argued that pupils should be allowed to have these

failures in order that the results of their work may be shown to them. There still remain after the plans are well made plenty of chances for demonstrating the results of improper work. There are here presented figures showing the preliminary plans made by fourth-grade pupils (Fig. 3), also the garden of another pupil after it is far enough along to show whether the plan was successful (Fig. 2).



FIG. 2.—A fourth-grade boy's combination vegetable and flower garden. Parsley, lettuce, and onions in the first and sweet alyssum and balsam, or touch-me-not, in the second. Some of the plants have been removed for use.

4. *Earth materials*.—In connection with the third grade, study was made of evaporation from the soil and the relation of soil to growth of the bulbous plants that were the center for much of the nature-work of that grade; further study should be made of the formation of soil through erosion and decay of rocks; removal, carrying, and deposition of soil as it is shown in streams, along the lake shore, and in laboratory experiment;

relation of plant and animal decay to soil formation; effect of winds upon soils; kinds of soils that are best for agriculture (see geography for location of best agricultural regions).

5. *The work with spiders.*—In taking this topic to illustrate in a more detailed way the kind of lessons that are used in this grade, it is not to be inferred that the topic is emphasized in the grade to the exclusion of other topics. The spider work

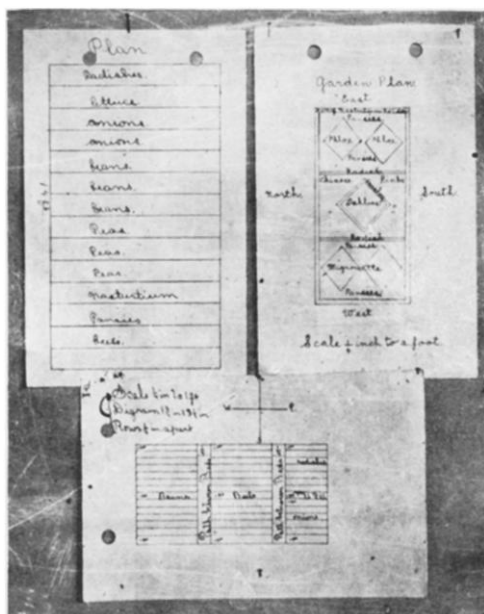


FIG. 3.—Children's garden plans.

consisted of ten lessons together with the voluntary and individual field work that the children did outside of school time. Spiders were brought into the room before the time for the first lesson and at the time that the lesson was to begin one of the spiders had spun a web part of the way down from the ceiling. It was taken as the starting-point in the work. The ten lessons as they were given by Miss Lackner, the teacher of this grade, are as follows:

First lesson: Observed spider spinning web from the ceiling, and tried to determine where the web comes from, and

how it is spun. The spider was seen to crawl part of the way back up the web after it was almost to the floor, and the pupils saw that the web was rolled into a small gray ball and carried by the spider. They tried to determine how the web was carried. The web was examined under a hand lens. The question as to the source of the web was not decided, but afforded much interest. It was suggested that all pupils who wished to do so should bring into the schoolroom before the next lesson, two days later, any spiders that they could find. The question as to what are the parts of the spider's body and how they are arranged was taken up but not determined in this lesson.

Second lesson: Many spiders had been brought into the room and kept in a cage which the children called the "spider hotel," and much interest was shown in the different kinds, the differences in behavior of those that were turned out in the room, and the different ways in which they were spinning their webs. "Where are spiders found?" was the question at first taken up and the experiences showed that many sources had been discovered. "Of what use are spiders' webs to them?" "How are they able to move so rapidly?" and "How do they spin the webs?" were constant questions. The children could not agree in their observations concerning the number of legs that the spiders have, nor as to the part of the body on which they are attached, and these points were left for following lessons. The interest was intense and the pupils individually without suggestion sought assistance from various sources. At this point in the work one of the girls found a fine yellow and orange specimen which she wished to keep in a cage by itself, for which arrangements were made. It was placed in a glass fruit jar, and within a day began to lay its eggs and weave the web by means of which the eggs were inclosed (Fig. 4). A better demonstration could scarcely be desired. The eggs were laid upon the leaf with which the spider had been brought into the room, and the building of the web about the eggball proved of interest to adults as well as to the children. While this had been occurring another female spider had been brought into the room within a small pasteboard box. The box containing the

spider was placed in a glass dish, the bottom of which was much wider than the pasteboard box. Soon the spider laid her ball of eggs, then she began to anchor the box in the center of the bottom of the glass dish. Web was placed from all sides to the wall of the dish, but with the first handling of the dish the box moved somewhat, when at once additional webs on all sides were placed so that even with the dish turned on edge the box



FIG. 4.—A spider's "egg ball"; eggs laid and the web woven in the schoolroom.

did not slip. This was a response to new conditions that interested and surprised everyone. In inverted flower pots in the garden the children found spiders and their eggs. The children concluded that the spiders had gone into "winter quarters" and examined them diligently for evidence upon this point.

Third lesson: This lesson was used in reading from books upon the spider's web, how it spins, life of the ground and water spiders, how spiders "fly" through the air, the mother and young spiders. The study that the children had made furnished an

excellent basis for this reading about things that they had not been able to see in this study.

Fourth lesson: A further study of the structure of the spider's body. Diagram on the board of the spider's body, ending by a diagram made by the teacher in which the pupils assisted by describing the parts, using the following names for them: abdomen, spinneretts, thorax, the eight legs, the seven parts, the eight eyes, and the feelers.

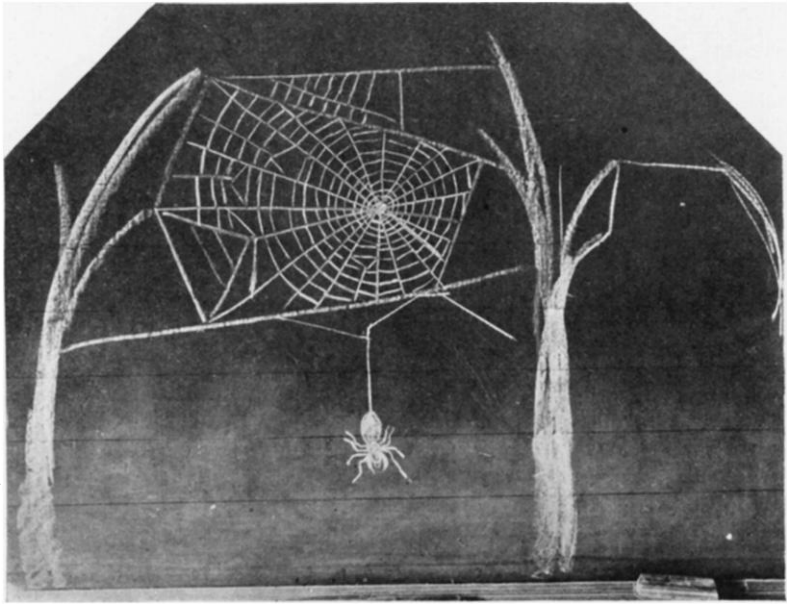


FIG. 5.—A child's board drawing representing his idea of the spider and its web. Not a drawing of any particular web.

Fifth lesson: Form and construction of spider's webs. Drawings of webs in different stages of construction as seen in the schoolroom and as remembered from the individual outdoor studies. The teacher had prepared upon the board a most carefully made and complete drawing of a spider, which was used for final discussion of the structure of the spider's body. A sample of the drawings by the children is shown in the picture (Fig. 5) which represents a pupil's drawing unchanged by

the teacher. One child had watched a spider spinning its web and was called upon to describe the process. This child had remained within the schoolroom during the recess period. I was going through the hallway near the room and, chancing to look within, saw the boy lying on his face in the corner of the room beneath a small table. Stepping into the room



FIG. 6.—Photograph of a spider's web. Taken early in the morning with dew upon it. Illustrates structure and form. Photograph by T. L. Hankinson.

to see what he was doing, I was met with the request: "Don't make a noise; there is a spider here and he is spinning his web and I want to see how he does it." I watched in silence for a while, and started to leave the room when the boy said: "I hope recess isn't over; the children will come in and I'm afraid the spider will stop." This child was able to describe the spinning from first-hand observation, and while doubtless some errors were made, his report was given in the real spirit of an investigator.

A photographic illustration of the form and structure of a spider's web is shown in Fig. 6.

Sixth lesson: Written lesson on the spiders, their webs, their uses to the spiders, their structure, the home of spiders, their eggs and young; drawings to illustrate the descriptions.

Seventh lesson: An oral report along the same lines of the written work but given at the elementary school's opening exercises before pupils from the other grades.

Eighth lesson: One child had found in the library a book which contained some interesting descriptions of spiders—a book that was not known to the teacher or the other pupils. The children read from this book and discussed it from the point of view of their previous work.

Ninth lesson: Spiders had been noted with webs floating in the air and some of the reading that had been used had spoken of this phenomenon. An experiment with a spider having this habit was tried in this lesson—an experiment that is suggested in Hodge's *Nature Study and Life*. On the top of a pencil that was supported in the center of a basin of water one of the spiders was placed. After making several attempts to escape, the spider began to spin a web and to let it float out into the air. The children were warned not to jump away in case the web should strike them, and when it did strike one of them the spider immediately crawled along the web and escaped from the water by way of the child's head. This experiment was repeated many times with much interest to all.

Tenth lesson: The use of pictures of spiders, final study of a spider to determine certain controverted points, and a final written paper.

Some of the books that will be found helpful are *The Spinner Family*, by Alice Jean Patterson (A. C. McClurg & Co., Chicago); *Nature-Study and Life*, by C. F. Hodge (Ginn & Co., Chicago); *Stories of Our Shy Neighbors*, by Mrs. M. A. B. Kelly (American Book Co., Chicago); *Nature-Stories for Young Readers* (Animal life), by Florence Bass (D. C. Heath & Co., Chicago); *The Common Spiders of the United States*, by J. H. Emerton (Ginn & Co., Chicago).